

REMARKS

Status of the Claims

Claims 1-25 are pending in this application. Claims 1-5 have been amended, as described below, in order to advance prosecution by clarifying several terms, which appear to have led to confusion during prosecution. Additionally, ranges recited in dependent claims 3-5 have been amended to comport with those specified in claims 1 and 2, from which they depend. The word "last," in the last line of claim 4 has been amended to read "least," in order to correct a typographical error. No new matter has been introduced as a result of these amendments.

The term "A block copolymer comprising a block copolymer of a vinyl aromatic hydrocarbon..." has been amended to recite "A block copolymer comprising a vinyl aromatic hydrocarbon...." Applicants have amended this language to avoid possible confusion between the overall block copolymer and the individual copolymer blocks, of which it is composed. Likewise, Applicants have also changed the structure of the claim limitations in lines 3-4 of claim 1 from "and a... of," to "wherein the... of said block copolymer,... is" in order to more clearly indicate that the molecular weight range of 30,000 to 500,000 applies to the claimed block copolymer.

Applicants have excised phrases describing certain "polymer blocks" in each of claims 1-5 and replaced them with language that expressly indicates aromatic hydrocarbons "having an average polymerization degree of 30 or more..." in order to clearly distinguish between *polymer blocks*, describing the individual polymer components having an average polymerization degree of 30 or more and the *block rate*, describing the relative incorporation of these blocks into the overall polymer.

Interview with the Examiner

Applicants sincerely thank Examiner Mullis for making the time to participate in an interview and for his helpful comments regarding the patentable aspects of the present application. See U.S. Patent Application No. 10/512,410, Interview Summary Sheet of January 16, 2007. During the interview, the examiner considered Applicants' proposed claim amendments and agreed that they sufficiently address the reasons set forth in the present Office Action for rejecting claims 1-25 under 35 U.S.C. §112, both first and second paragraphs. Accordingly, the examiner preliminarily agreed that the amended claims satisfy 35 U.S.C. §112, both first and second paragraphs.

The examiner also considered and preliminarily agreed with Applicants' contention that the instant claims are patentable over Hoshi et al. (U.S. Patent No. 6,235,847, herein the '847 patent) because the Hoshi et al. reference describes polymers that contradict Applicants' express claim limitation that 40 to 80% by weight of the vinyl aromatic hydrocarbons having an average polymerization degree of 30 or more have a molecular weight of 35,000 or less, as measured by GPC. Lastly, the examiner directed Applicants' attention to Example I of U.S. Patent No. 5,227,419 (aka "Moczygemba"; herein the '419 patent), indicating that this example may inherently describe a polymer that meets all of Applicants' claim limitations. See '419 patent at col. 9, lines 7-61. Applicants' thank the examiner for identifying this opportunity for more clearly distinguishing their claims from the '419 patent's disclosure and provide guidance for doing so below. *Infra* at Possible Inherent Anticipation of Claims 1-25.

Rejection of Claims 1-25 under 35 U.S.C. §112, Second Paragraph

Claims 1-25 have been rejected under 35 U.S.C. §112, second paragraph, for being indefinite in failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. U.S. Patent Application No. 10/512,410, Office Action of Aug. 2, 2007 (herein Office Action). Specifically, the examiner has indicated that the language “vinyl aromatic hydrocarbon polymer blocks” is unclear. *Id.* The examiner arrives at this position by comparing Applicants’ remarks regarding homopolymeric blocks to Applicants’ claims to polymers having a specific block rate. *Id.* Applicants respectfully assert that the terms “homopolymeric blocks” and “block rate” refer to different aspects of the invention and do not contradict one another. The term homopolymeric, where used to indicate that a given block is composed of one monomeric repeat unit, does not contradict Applicants’ claim to block copolymers which incorporate such blocks with a block rate of 10-90%.

Generally, block copolymers consist of homopolymeric blocks:

“Block copolymer molecules are made of a small number (usually 2 or 3) of blocks (or sequences), each of which being homopolymeric”

Rempp, P. et al. Polymer Synthesis 2nd, Basel: New York, 1991, p. 29.

In contrast to the above quoted term “homopolymeric,” which describes the composition of a given block within a copolymer, the term “block rate,” in the context of the present application refers to the ratio of vinyl aromatic hydrocarbon polymer blocks (i.e., vinyl aromatic hydrocarbon blocks having a degree of polymerization of 30 or more) to all vinyl aromatic hydrocarbons in the block copolymer. See U.S. Patent App. No. 10/512,410, Specification, p. 9. Accordingly, a block copolymer may consist of homopolymeric blocks while also having a block rate of less than 100% because the

block rate considers the composition of the whole polymer rather than individual blocks. If a polymer were to comprise both homopolymeric blocks and components that are not homopolymeric blocks (e.g., polymers with a degree of polymerization of less than 30) then the block rate would be less than 100%, while each homopolymeric block, by definition, would be composed entirely (i.e., 100%) of one type of monomeric repeat unit.

In order to advance prosecution, Applicants have amended the claims to remove any confusion regarding the term "block." In particular, Applicants have introduced claim language which expressly recites the meaning of certain "block" aspects of the invention. In light of the above clarification of terms and claim amendments, Applicants respectfully submit that the instant claims 1-25 are definite within the meaning of 35 U.S.C. §112, second paragraph. Accordingly, Applicants request that the examiner withdraw the rejection of claims 1-25 under this section.

Rejection of Claims 1-25 under 35 U.S.C. §112, First Paragraph

Claims 1-25 have been rejected under 35 U.S.C. §112, first paragraph for failing to convey to one skilled in the art that Applicants had possession of the claimed invention at the time of filing. Office Action at p. 2. Applicants understand that the examiner bases this rejection on his observation that the specification as filed does not disclose that the vinyl aromatic polymer blocks have a block rate of 10-90%. *Id.* Applicants respectfully submit that the examiner's rejection of claims 1-25 under 35 U.S.C. §112, first paragraph likely originates from the above described confusion of the terms "polymer blocks" and "block rate." *Vide supra* at Rejection of Claims 1-25 under

35 U.S.C. §112, second paragraph. As discussed above, these block rates do not refer to the independent vinyl aromatic hydrocarbon blocks themselves but rather the relative incorporation of blocks (*i.e.*, homopolymeric blocks) as compared to other sources of vinyl aromatic hydrocarbon. Applicants refer the examiner to Tables 1 and 2, which exemplify block rates from 8% to 86%. See U.S. Patent Application No. 10/512,410, specification at 72-73. In light of Applicants' disclosure of block rates of 10-90% and the above described distinction between the terms "block rate" and "block," *i.e.*, homopolymeric block, Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. §112, first paragraph.

Possible Inherent Anticipation of Claims 1-25

During the interview, the examiner expressed concern that one example of the '419 patent (*i.e.*, Example I, '419 patent at col. 9, lines 7-61) may inherently describe the instantly claimed invention. See U.S. Patent Application No. 10/512,410, Interview Summary Sheet of January 16, 2007. Applicants believe that the method disclosed does not describe (neither expressly nor inherently) a polymer within the scope of Applicants' claims.

Applicants respectfully assert that Example I of the '419 patent describes a method that would create a polymer with less than 40% of its vinyl aromatic hydrocarbon blocks (*i.e.*, vinyl aromatic hydrocarbons having an average polymerization degree of 30 or more) in the molecular weight range of 35,000 or less. Applicants believe, based on calculations, that the '419 patent's Example I describes a polymer

with, at most, about 32% of its vinyl aromatic hydrocarbons in the molecular weight range of 35,000 or less:

- First, Applicants believe that only the styrene in steps 2 and 5 of the '419 patent's Example I may possibly result in vinyl aromatic hydrocarbon blocks (i.e., vinyl aromatic hydrocarbon blocks having an average polymerization degree of 30 or more) in the molecular weight range of 35,000 or less; See '419 patent at col. 9, lines 7-61.
- Second, The total vinyl aromatic hydrocarbon resulting from steps 2 and 5 is 22.5 phm, which represents about 32% of the 70 phm styrene present in Example I's overall polymer; *Id.*
- Third, as the examiner notes, some of the vinyl aromatic hydrocarbon from step 2 will be incorporated into the high molecular weight block, formed in step 1, resulting in less than 32% present in vinyl aromatic hydrocarbon blocks in the molecular weight range of 35,000 or less. Office Action at p. 4.

In light of the above reasons, Applicants respectfully assert that Example I of the '419 patent does not inherently describe the instantly claimed invention for at least the reason that the Example I describes a method for synthesizing a polymer, which would inherently have a vinyl aromatic hydrocarbon composition of outside the range claimed by Applicants (about 32% compared to 40-80%).

Rejection of Claims 1-25 under 35 U.S.C. §103(a)

Claims 1-25 have been rejected under 35 U.S.C. §103(a) for being unpatentably obvious over the '419 patent. Office Action at 3. The examiner contends that

“applicants level of 40 percent would occur if slightly more styrene or BuLi were used” in one of the examples in the ‘419 patent. *Id.* at 4. Applicants agree with the examiner’s position in the Office Action insofar as the ‘419 patent does not describe the instantly claimed invention but, i.e., the ‘419 patent must be modified in order to arrive at the instant claims. However, regarding the rejection of claims 1-25 for obviousness over the ‘419 patent, Applicants respectfully disagree with the position that modifying the disclosure of the ‘419 patent to arrive at Applicants’ claimed invention would have been obvious to one skilled in the art at the time Applicants’ filed the present application. Accordingly, Applicants’ respectfully request that the examiner reconsider the rejections of claims 1-25 under 35 U.S.C. §103(a) in light of the reasons described below.

Applicants respectfully submit that selectively modifying the ‘419 patent’s disclosure in the way proposed by the examiner does not comport with the controlling three-part analysis for establishing a prima facie case of obviousness under 35 U.S.C. § 103. See *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966); *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 82 USPQ2d 1385 (2007) (“...the [*Graham*] factors continue to define the inquiry that controls.”) In order to establish a prima facie case of obviousness, the examiner must meet the burden set forth in *Graham* and described in the M.P.E.P. by objectively performing each of the following factual inquiries:

- “(A) Ascertaining the scope and contents of the prior art;
- (B) Ascertaining the differences between the claimed invention and the prior art; and
- (C) Resolving the level of ordinary skill in the pertinent art.”

See *Graham* 383 U.S. 1 at 17-18; see also M.P.E.P. § 2141. Additionally, “[t]he examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.” M.P.E.P. § 2142.

Applicants respectfully submit that the examiner has not established a *prima facie* case of obviousness by applying the test outlined above. Particularly absent from the examiner’s rejections is an express indication of the level of ordinary skill in the pertinent art. Applicants respectfully submit that the examiner’s assertion that the description of ‘419 patent may be specifically modified to coincide with the instant claims does not adequately meet the burden of factually and objectively showing that Applicants’ claimed invention is obvious. To the contrary, the Supreme Court counseled that reasons for an obviousness rejection should be made explicit:

“[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”

KSR, 127 S.Ct. 1727 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Applicants respectfully submit that the examiner has neither articulated reasons nor provided rational underpinnings for modifying the ‘419 patent. Rather, the examiner appears to use Applicants’ claims for guidance while selectively modifying particular aspects of the ‘419 disclosure in order to most closely resemble Applicants’ claims.

The ‘419 patent discloses a five-step synthesis for producing tapered block copolymers, comparing its inventive aspects to a control example, Example I. See ‘419 patent at col 9, lines 7-61. Example I includes five synthetic steps, each of which must

be defined by specifying the reaction conditions. Defining the reaction conditions for each step requires specifying monomer concentration, initiator concentration, temperature, time, solvent(s), etc., in accordance with the '419 specification. See, e.g., *id.* at col 3 *et seq.* The examiner bases the present obviousness rejection of claims 1-25 on the contention that it would be obvious to selectively modify a specific reaction condition (i.e., the initiator concentration or the monomer concentration) in a particular synthetic step within the larger context of Example I. Applicants respectfully assert that, without reasons for doing so, none of the following would have been obvious when they filed the present application: Choosing Example I from the '419 disclosure; Choosing synthetic step 2 from Example I's five synthetic steps; Choosing the styrene concentration and/or NBL concentration(s) from the other reaction conditions; Changing the styrene and/or NBL concentrations in exactly the way needed to produce Applicants' claimed invention. Applicants respectfully request that the examiner reconsider the line of reasoning that would lead to the allegedly obvious modifications, particularly whether such modifications would be obvious without considering Applicants' claims.

Applicants respectfully submit that using hindsight (e.g., using pending claims as the basis for selectively modifying a reference) is not proper when arriving at a finding of obviousness under 35 U.S.C. § 103. See, e.g., *In re McLaughlin* 443 F.2d 1392, 1395 (C.C.P.A. 1971); see also M.P.E.P. § 2145 (X)(A) and references cited therein. Applicants respectfully submit that in order for the '419 patent to render the instant claims obvious, the examiner must provide some reason for purposefully modifying the '419 patent in order to arrive at Applicants' instantly claimed invention. See *KSR v. Teleflex*, 82 USPQ 1385 (2007). Applicants respectfully request that the examiner

withdraw the rejection of claims 1-25 under U.S.C. §103(a) because, absent a *reason* to modify the '419 patent to arrive at Applicants' claims 1-25, the '419 patent does not render these claims obvious.

Claims 1-25 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hoshi et al.. U.S. Patent No. 6,235,847; herein the '847 patent. Specifically, the examiner bases this rejection on the following reason:

“Choice of the minimum molecular weight of 30% highest molecular weight block copolymer with a single 120,000 molecular weight block and the remaining 3 terminal blocks for both block polymers of 30,000 molecular weight would result in a composition having all of applicants limitations in combination.”

Office Action at p.5.

Applicants respectfully submit that the examiner has not established a *prima facie* case of obviousness under 35 U.S.C. §103(a) because the examiner has neither identified the differences between Applicants' invention and the prior art nor ascertained the level of skill on the art. *See Graham*. Additionally, the examiner has not provided reasons for selectively modifying the particular aspects of the '847 patent to arrive at the instant claims. To the contrary, the '847 patent provides *clear reasons for not modifying* its invention in the manner suggested by the examiner:

“When the peak molecular weight of the fraction (α) is less than 50,000 or more than 150,000, or when the peak molecular weight of fractions (β) is less than 150,000 or more than 350,000, the impact resistance of the linear block copolymer is disadvantageously lowered.”

'847 patent at col. 6, lines 44-48.

The α and β fractions of the '847 patent describe lower and higher molecular weight blocks, respectively, within the block copolymers of the '847 invention. *Id.* at line 35 *et seq.* The examiner suggests that it would be obvious to modify the '847 patent so

as to make (1) the highest molecular weight block “a single 120,000 molecular weight block” and (2) “the remaining 3 terminal blocks for both block copolymers of 30,000 molecular weight.” Office Action at p. 5. The examiner’s proposed modifications would (in terms of the ‘847 patent) require both a β fraction of a molecular weight less than 150,000 (i.e., 120,000) and an α fraction less than 50,000 (i.e., 30,000). The ‘847 patent expressly teaches away from each of these modifications, as quoted above and, accordingly, Applicants respectfully submit that the ‘847 patent does not render the instant claims 1-25 obvious. *In re Geisler*, 116 F.3d 1465 (Fed. Cir. 1997). In light of the above reasons, Applicants respectfully request that the examiner withdraw the rejection of claims 1-25 under 35 U.S.C. §103(a) over the ‘847 patent.

Conclusions

Applicants respectfully request that the examiner withdraw the rejections of claims 1-25 under 35 U.S.C. § 112, first and second paragraphs in light of Applicants' clarification of the terms "block rate" and "blocks." Additionally, Applicants' respectfully request that the examiner withdraw the rejections of claims 1-25 under 35 U.S.C. § 103(a) because neither of the references cited discloses or renders obvious Applicants' claimed invention for the reasons set forth above.

If there are any fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 06-0916. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our deposit account.

Respectfully submitted,

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